No. 9

Proceedings

*of*

# The Canadian Phytopathological Society

NINTH SESSION

June 19th to 21st, 1939

(VANCOUVER, B.C.)

EDITORIAL COMMITTEE

I. L. CONNERS

J. H. CRAIGIE T. C. VANTERPOOL

OTTAWA, CANADA

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COMMONWEALTH MYCOLOGICAL INSTITUTE
29 DEC 1961

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# THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

## LIST OF OFFICERS AND COUNCIL 1938-39

*President*

H. R. McLarty, Dominion Laboratory of Plant Pathology, Summerland, B.C.

*Vice-President*

G. B. Sanford, Dominion Laboratory of Plant Pathology, Edmonton, Alta.

*Secretary-Treasurer*

L. W. Koch, Dominion Sub-Laboratory of Plant Pathology, Harrow, Ont.

*Councillors*

J. F. Hockey, Dominion Laboratory of Plant Pathology, Kentville, N.S.
I. L. Conners, Central Experimental Farm, Ottawa, Ont.

# *Announcement*

CANADA IS NOW grimly involved in a gigantic war to protect our liberties against "Hitlerism". Science has transformed modern warfare into an exceptionally highly specialized effort wherein all the resources of a nation have to be skilfully and thoroughly mobilized. The present and potential food supplies of Canada will play an important rôle in ultimate victory, especially if the struggle be long. Members of the Canadian Phytopathological Society who are now employed by various governments and institutions are giving their very best attention to details which will insure the increase and the conservation of these food supplies. As a means of co-ordinating the efforts just indicated, your Executive has appointed a special War Emergency Committee, representative as far as possible of each province or area, to examine the general situation and to make such recommendations as may seem necessary. The personnel of the Committee is as follows: J. F. Hockey (Chairman), E. Campagna, J. H. Craigie, H. T. Güssow, J. E. Howitt, Wm. Newton, T. C. Vanterpool, and L. W. Koch (Secretary). The Committee will report to the Society at the next annual meeting.

G. B. SANFORD, *President.*

## Minutes of the Ninth Annual Meeting Held at Vancouver, B.C., June 19 to June 21, 1939

### BUSINESS SESSION

The President, H. R. McLarty, called the business meeting to order at 10 a.m., June 19, with an attendance of twenty-six. J. F. Hockey acted as secretary in the absence of the Secretary-Treasurer, L. W. Koch.

The minutes were read, and on motion of R. E. Fitzpatrick and F. J. Greaney they were approved.

The report of the Common Names Committee was not available for the business session.

Miss Irene Mounce presented a report of the Committee on the Imperial Mycological Institute recommending (1) that Dr. Güssow represent the Society at the Imperial Mycological Conference, and (2) that members send two copies of all published papers to the Institute Director. On motion of I. Mounce and R. C. Russell the report was adopted.

The report of the Secretary-Treasurer was read, and on motion of G. E. Woolliams and J. W. Eastham it was approved. On the motion of J. W. Eastham and F. J. Greaney an honorarium of $15.00 was voted for Miss K. E. Webb for her assistance in stenographic work for the Society.

Applications for membership from G. W. Ayers and L. E. Tyner were received and accepted on the motion of R. E. Fitzpatrick and I. Mounce.

The Chairman reported that the Executive had been circularized concerning the voting of $60.00 towards the rental of a room for the meetings of the Society. He explained that other arrangements had been possible and that the room was available at no expense to the Society.

The following committees were named by the Chairman for convention duties: Publicity, W. R. Foster, F. J. Greaney, R. E. Fitzpatrick; resolutions, J. W. Eastham, W. C. Broadfoot, J. E. Bier.

On motion of F. J. Greaney and G. A. Scott, Messrs. I. L. Conners and H. N. Racicot were appointed auditors.

The standing Editorial Committee was re-elected on the motion of F. J. Greaney and W. R. Foster. The standing committees on the Imperial Mycological Institute and Common Names were re-appointed on motion of J. W. Eastham and J. E. Bier. The personnel of these committees is as follows:

(1) Editorial Committee: I. L. Conners, J. H. Craigie, and T. C. Vanterpool.
(2) Committee on the Imperial Mycological Institute: Irene Mounce, T. Johnson, and D. L. Bailey.
(3) Common Names Committee: I. L. Conners, J. G. Coulson, L. Godbout, A. W. Henry, H. N. Racicot, and Wm. Newton.

The names of J. D. Menzies and W. D. Touzeau, of Vancouver, were proposed for membership and accepted on motion of I. Mounce and T. Johnson. The name of P. J. Salisbury was proposed as a member and accepted on motion of J. D. Menzies and R. E. Fitzpatrick. The President cordially welcomed the new members to the Society. He also declared the election of new officers and expressed his appreciation for the honour of being permitted to serve as President during the past year.

Following the presentation of scientific papers on Wednesday morning, a concluding business session was held with J. F. Hockey, Vice-President elect, in the chair in the absence of G. B. Sanford, President.

On the motion of H. R. McLarty and G. E. Woolliams, R. J. N. Myers and Frank Dickson were elected members of the Society.

It was moved by F. J. Greaney, seconded by W. C. Broadfoot, and carried, that members express their sincere appreciation to the retiring President and Executive on the excellent facilities and programme provided for this session of the Society.

W. R. Foster reported for the Publicity Committee that abstracts and brief reports of sessions had been provided to the press and used liberally. J. W. Eastham presented the report of the Resolutions Committee. The latter moved its adoption, which was seconded by Miss I. Mounce, and carried.

The Chairman, prior to the closing of the meeting, thanked the members for their prompt attendance at the sessions and their full co-operation in the very successful convention. On behalf of the newly elected officers, he thanked the members for their confidence and hoped that the 1940 sessions would be equally stimulating and conducive to increased interest in the phytopathological work in Canada.

## SCIENTIFIC SESSIONS

A total of seventeen papers was presented at the meetings of the ninth session of our Society. The attendance varied from 20 to 35. A wide field of research was covered by the papers and considerable discussion followed their presentation. Abstracts, arranged alphabetically according to author, are given below:

BIER, J. E. Septoria canker of introduced and native hybrid poplars.

Studies have demonstrated that *Septoria musiva* Peck, a North American fungus, produces destructive stem cankers, in addition to leaf injury, on certain introduced (*Populus Rasumowskyana* Schroed., *P. Petrowskyana* Schroed., and *P. berolinensis* Dipp.) and native hybrid (Saskatchewan and Northwest) poplars. These trees have been widely propagated in the Prairie Provinces for windbreak and shelterbelt purposes. The pathogen has been found solely as a

leaf-spotting parasite on a number of native poplars (*P. tacamahaca* Mill., *P. balsamifera* L., *P. tremuloides* Michx., *P. trichocarpa* Torr & Gray), which include species of wide distribution in Canada and the United States.

FITZPATRICK, R. E., and J. E. BRITTON. Bitter pit of apple as influenced by time of picking and heaviness of crop.

A correlation was established between the stage of maturity of Cox Orange apples at the time of picking and the amount of bitter pit that developed subsequently in storage. The stage of maturity was determined by the starch-iodine reaction. It was shown that the time of picking materially influenced the amount of bitter pit that developed, the earlier pickings developing substantially more bitter pit than the later ones. Fruit from trees bearing a light crop consistently developed more bitter pit than fruit from trees bearing a heavy one. In general, the results were in complete agreement with the findings of W. M. Carne and his associates in Australia (Carne, W. M., H. A. Pittman, and H. G. Elliott. Bitter pit of apples in Australia. Commonwealth of Australia, Council Sci. and Industr. Res. Bull. 41. 1939).

FOSTER, W. R. Dark berry of *Cotoneaster horizontalis.*

Dark berry caused by *Phytophthora Cactorum* is a new disease of *Cotoneaster horizontalis.* It is widespread in the coastal districts of British Columbia. The other species of Cotoneaster examined, *C. Francheti, C. microphylla, C. Wilsoni, C. thymifolia,* and *C. Simonsi,* were practically free from disease.

GREANEY, F. J. The value of seed treatment under dry farming conditions.

Field trials with disinfected cereal seed have demonstrated that, under dry farming conditions, seed treatment with the organic mercury dusts at present in general use is a profitable farm practice where the seed, or the soil in which it is sown, is heavily contaminated with pathogenic fungi; or where the seed is shrunken, broken, or mechanically injured. Significant increases in field germination, or in yield, were not obtained, however, where disinfected, sound, virtually disease-free seed was sown in ordinary field soil. As a matter of fact, under dry farming conditions, disinfection of sound, disease-free seed of small grain crops often resulted in decreased yield.

GREANEY, F. J., J. E. MACHACEK, and W. L. GORDON. The fungus flora of wheat and barley seeds.

An investigation was made of the internal fungus flora of a large number of seed samples of common wheat, durum wheat, and barley grown in Manitoba in 1937 and 1938. Many different fungi were isolated from surface-sterilized kernels of the samples. Species of the genera *Alternaria* and *Helminthosporium* predominated. Although *Fusarium* spp. and *Helminthosporium sativum* occurred in a fairly high percentage of the samples, they were associated with only a very small percentage of the kernels. According to this seed survey, severe infections with *H. sativum* were confined to a few small districts of Manitoba in 1937 and 1938, while *Fusarium culmorum* did not occur even in 0.05 per cent of the kernels of the three classes of seed examined.

HOCKEY, J. F., and C. C. EIDT. Resistance of apple seedlings to scab.

Data are presented showing the foliage reaction to apple scab (*Venturia inaequalis*) of many seedlings of known parentage. McIntosh and Delicious as female parents gave a high percentage of scab-susceptible progeny. Cox Orange, Golden Russet, and Deacon Jones gave a good percentage of resistant seedlings, while Red Winter Reinette gave the largest proportion of resistant progeny. Seedlings from triploid parents showed much less vigour than seedlings from diploid parents.

JOHNSON, T., and A. M. BROWN. Experiments on oat blast.

It has been shown experimentally that the amount of oat blast is readily influenced by the nutritional conditions of the oat plant from the time the spikelets are initiated until just prior to the emergence of the panicle. Any adverse influence on the normal nutritional conditions of the plant during this period tends to increase the amount of blast. At this stage of growth, the amount of blast has been experimentally increased by (1) reducing the water supply, (2) withholding mineral nutrients, (3) artificial injury to the leaves, (4) leaf injury caused by rust, and (5) growing oat plants under conditions of progressively diminishing day-length.

JOHNSON, T., and MARGARET NEWTON. Crossing and selfing studies with physiologic races of oat stem rust.

Evidence has been obtained through crossing and selfing studies that many physiologic races of oat stem rust contain both homozygous and heterozygous lines; the latter when selfed tend to produce races more virulent than the selfed race. In crosses between races, the characters for low virulence are generally dominant so that the hybrid race is often identical with the less virulent of the two parent races. Selfing and crossing studies therefore indicate that in oat stem rust characters for high virulence are recessive. Reciprocal crosses between physiologic races suggest that the cytoplasm, as well as the nucleus, contributed to the inheritance of certain pathogenic characters.

JONES, WALTER. Wood decay of crowns and roots of raspberry plants.

Sporophores of *Armillaria mellea* Vahl ex Fr., *Hypholoma fasiculare* Fries and *Pholiota* sp. were found growing on the crown of raspberry plants in several plantations in the Fraser Valley, B.C., during 1936 and 1937.

*Armillaria mellea* was found to cause the decline and death of numerous plants of the Cuthbert, Viking, and Lloyd George varieties. Wood decay of the crowns and main roots was associated with infection by this fungus. *Hypholoma fasiculare* was rather abundant and widely distributed in affected plantations. Sporophores of the fungus usually appeared on old cane stubs and crowns of living plants, but occasionally they were observed growing on the bark of fruiting canes and current season's canes. Soft, stringy, whitish decay of the wood of the roots and crowns was generally associated with this fungus.

A *Pholiota* species was found growing on an unthrifty Cuthbert raspberry plant. The wood of the crown and main roots of this plant showed considerable decay, the decayed wood being hard in texture and reddish brown in colour.

It is suggested that a plantation crop such as raspberries should not be grown on newly cleared land, but should be preceded by hoed crops for a few years.

McLarty, H. R. Problems of plant pathology in the Okanagan Valley.

The paper presented a résumé of the problems that are under investigation at the Dominion Laboratory of Plant Pathology, Summerland, B.C. The influence of a semi-arid climate on the prevalence of foliar diseases is indicated by the absence of apple scab in the southern section of the district where the annual average precipitation is 12 inches or less and the moderate severity of the disease in the northern sections where the annual precipitation is slightly greater, amounting to 22 inches in the Salmon Arm district. The major portion of the research work has been devoted to investigations on physiological disorders which are of frequent occurrence and which are causing or have caused severe economic losses. The discovery of boron as a corrective for drought spot, corky core, and die back of apple, and associated troubles on pear, peach, plum, etc., was discussed and the symptoms of these disorders were illustrated with slides. Other disorders, the causes of which are still unknown, were described. These included a spotting of the fruit and leaves of apricot, marginal leaf burn of apple, bitter pit of apple, and black end of pear. Virus diseases of tree fruits are receiving attention and a survey of all stone fruit trees was started in 1938. To date no serious disease of this nature has been observed.

Mead, H. W. Some effects of fungicides on cereal seeds, seed-borne fungi, and soil fungi.

New Improved Ceresan, Leytosan, and formalin delayed the initial growth of fungi, mostly Fungi Imperfecti, from cereal seeds placed on agar. The delay was as much as two to six days, depending on temperature and treatment. New Improved Ceresan was most effective. New Improved Ceresan did not prevent the growth of *Helminthosporium sativum* on soil particles which were in contact with treated seeds. The fungus sporulated very scantily in the zone about the treated seeds, while spores were commonly present near or on untreated seeds. These treatments may cause seed injury if directions are not closely followed. The possibility that some varieties of wheat are less easily injured by seed treatment than others is being investigated. Treatment of farmers' seed with New Improved Ceresan increased emergence while formalin reduced the stand and delayed emergence.

Menzies, J. D. The anthracnose disease of *Daphne Mezereum*, caused by *Marssonina Daphnes*.

The anthracnose of the ornamental shrub, *Daphne Mezereum*, is a disease of European origin and has been unknown hitherto in North America. It has appeared in southern British Columbia, where it has reached serious proportions. It manifests itself as a leaf spot, which causes serious defoliation accompanied by blossom blight and premature berry drop. The causal fungus is the melanconiaceous fungus, *Marssonina Daphnes* (Desm. & Rob.) Magnus. The fungus overwinters on the scales of the dormant buds in the form of stroma-like lesions, which sporulate during blossom time in the spring. Epiphytotics occur when high summer temperatures are associated with rain. Summer spraying has not

proved to be an effective means of control, but it is hoped that a strong dormant spray followed by summer spraying with Bordeaux mixture may prove satisfactory.

Mounce, Irene. Forest mycology in British Columbia.

The summer of 1938 was spent in collecting and culturing forest fungi in British Columbia. Some observations were made on the occurrence of such fungi as *Fomes annosus*, *F. robustus* var. *tsugina* (*F. Hartigi*), *F. nigrolimitatus*, *Polyporus Berkeleyi*, *P. cuneatus*, *P. montanus*, *P. ursinus*, *Poria Weirii*, "*Trametes serialis*", etc. The importance of an adequate mycological herbarium and a collection of stock cultures of wood-destroying fungi in any forest pathological programme was discussed.

Peterson, R. F., and A. B. Masson. Inheritance of the stem rust immunity of the wheat varieties, Kenya R. L. 1373 and McMurachy's Selection.

The two varieties of *Triticum vulgare*, Kenya R. L. 1373 and McMurachy's Selection, the former originating in Kenya Colony and the latter in Canada, are immune to stem rust. Various crosses were made between these wheats and other varieties, and hybrid populations ($F_1$, $F_2$ and in some cases $F_3$) were studied in the field and greenhouse to determine the mode of inheritance of this immunity. In the crosses studied evidence was obtained that in the case of both Kenya and McMurachy's Selection the immunity is recessive and dependent on one main pair of genetic factors. Minor factors modifying the degree of susceptibility in susceptible derivatives were indicated. The factors for immunity of these two wheats were found to be allelomorphic.

Russell, R. C. Pathogenicity tests with cultures of *Ophiobolus graminis*.

The results of pathogenicity tests with various cultures of *Ophiobolus graminis* Sacc. are given. The cultures used came from Saskatchewan and several other parts of the world. They have been in pure culture from six months to over fifteen years. The pathogenicity of the isolates appeared to fluctuate over long periods of time, although the general tendency seemed to be for it to decrease with the passage of time. Attempts to alter the pathogenicity, by varying the environmental conditions under which the pure cultures were maintained, were not successful.

Salisbury, P. J. A Typhula rot of stored turnips in British Columbia.

A sclerotial rot, prevalent in spring on pit-stored turnips in the Pemberton district of British Columbia, is caused by a species of Typhula. Primary manifestations are sunken, circular, shallow, brown, dry-rot lesions. Sclerotia develop under the epidermis and become erumpent. Secondary invasion by bacteria results in an extensive wet rot on which numerous dark-brown sclerotia and white mycelium develop.

Claviform sporophores lacking hymenia were grown from sclerotia. These, together with hyphal clamp-connections, identified the organism as belonging to the genus Typhula. Cultural similarity to *T. umbrina*, especially with respect to temperature relations, was found by a comparison with four known species of Typhula.

The disease is locally important on pit-stored turnips which lose their salability for table use through even small lesions. Preventive measures suggested are storage in root-houses, sanitation, and pit disinfestation.

Woolliams, G. E. The comparative value of various fungicides in the control of apple scab in the Northern Okanagan Valley.

The paper presents the results of scab control with various fungicides over a period of five years. These indicate that under the climatic conditions prevailing, all copper sprays so far developed have been very injurious to foliage, and are not safe to use. Lime sulphur, at strengths of 1-40, has caused serious foliage injury. Greater dilutions of lime sulphur or combinations of diluted lime sulphur with neutral sulphurs, have given satisfactory control and have greatly reduced foliage injury.

## REPORT OF SECRETARY-TREASURER

*Mr. President,—*

I beg to submit, herewith, the report of the Secretary-Treasurer for the year ending May 31, 1939.

The eighth annual meeting of the Society was held at the Lisgar Collegiate Institute, Ottawa, June 28th to 29th, 1938. It consisted of two scientific sessions held in conjunction with those of the American Phytopathological Society, and one business session. The first scientific session was devoted to a visit to the Division of Botany and Plant Pathology, Arboretum, Central Experimental Farm, where, by means of charts, photographs, infected host materials and cultures, research problems under investigation by various members of the Division throughout the Dominion were graphically portrayed. The other scientific session consisted of a symposium on root crops and seed-borne diseases where six papers were presented and discussed.

### Proceedings

The 1938 Proceedings contains the Minutes, etc., the titles and abstracts of papers read at the Ottawa meeting, and the titles of papers published by members of the Society from June 1, 1937, to May 31, 1938. Due to an unfortunate delay these will not be available for distribution to members until several weeks hence.

### Election of Officers

Nomination ballots were sent out in April to be returned by April 29. A total of 48 ballots was returned. As a result, the following members were nominated: A. W. Henry, J. E. Howitt, and G. B. Sanford for President; J. W. Eastham, W. F. Hanna, and J. F. Hockey for Vice-President; F. J. Greaney, T. Johnson, and P. M. Simmonds for Councillor. Electoral ballots were mailed in May to be returned on or before May 27. Fifty-three ballots were returned, resulting in the election of Dr. G. B. Sanford as President, Mr. J. F. Hockey as Vice-President, and Dr. F. J. Greaney as Councillor. Mr. R. J. Haslam, Miss K. E. Webb, and Dr. L. W. Koch acted as scrutineers.

## Membership

On May 31st there were 77 members, of whom four had paid their fees in advance. Including the honorary members, the membership is now 81 as compared with 78 last year. At the end of the year it was necessary to remove six names from the list of members, though some of these will undoubtedly be reinstated at a later date.

During the past year seven members were reinstated, three new members were added to the list, and one application for membership in the Society was received.

## Finances

As indicated by the attached financial statement, total revenue for the current year was $88.02, while the total expenditure amounted to $41.14, leaving a net balance of $713.25 at the end of the year. This compares with a net balance of $666.37 on May 31, 1938, the increase being due largely to the fact that the cost of printing the 1938 Proceedings has not yet been deducted. However, when current operating expenditures are compared with revenue receipts, it will be seen that our present financial position is satisfactory.

## The Ninth (Vancouver) Meeting

The President, Dr. McLarty, has assumed the major responsibility of organizing the 1939 programme and integrating it with that of the C.S.T.A.

Respectfully submitted,

L. W. Koch, *Secretary-Treasurer.*

## FINANCIAL STATEMENT

### Cash Account

1938-39

Revenue:

| | | | |
|---|---|---|---|
| Balance brought forward | | | $666.37 |
| Fees: 1937, 6 | $ 6.00 | | |
| 1938, 67 | 67.00 | | |
| 1939, 5 | 5.00 | | |
| | | $78.00 | |
| Bank Interest | 10.02 | | |
| | | 10.02 | |
| | | | 88.02 |
| | | | $754.39 |

Expenditure:

| | | | |
|---|---|---|---|
| Stenographic Services (Honorarium) | $15.00 | | |
| Stationery | 12.39 | | |
| Exchange | .75 | | |
| Stamps | 13.00 | | |
| | | 41.14 | 41.14 |
| Balance on hand, May 31, 1939 | | | $713.25 |

Of the Balance:

| | |
|---|---|
| On deposit | $703.93 |
| In petty cash | 9.32 |

# TITLES OF PAPERS PUBLISHED BY MEMBERS OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

## From June 1, 1938, to May 31, 1939


Beall, G., G. M. Stirrett, and I. L. Conners. A field experiment on the control of the European corn borer, *Pyrausta nubilalis* Hubn., by *Beauveria bassiana* Vuill. II. Sci. Agric. 19: 531-534. 1939.

Black, L. M. Properties of the potato yellow-dwarf virus. Phytopath. 28: 863-874. 1938.

————————. Inhibition of virus activity by insect juices. Phytopath. 29: 321-337. 1939.

————————. Viruses in plants. The Am. Biol. Teacher 1: 175-180. 1939.

Broadfoot, W. C., and L. E. Tyner. Studies on foot and root rot of wheat. VI. Methods of securing infection of wheat seedlings for study in nutrient solutions. Can. Jour. Res. 16 (Sec. C): 253-261. 1938.

Conners, I. L. Canadian Plant Disease Survey Annual Report 18 (1938): i-xii, 1-112. 1939. (Mimeographed.)

Craigie, J. H. Economic diseases of field crops in Manitoba. Economic Survey Board, Province of Manitoba, 1939.

Groves, J. Walton. *Dermatea acerina* and *Pezicula acericola*. Mycologia 30: 416-430. 1938.

————————. Some *Pezicula* species and their conidial stages. Can. Jour. Res. 17 (Sec. C): 125-143. 1939.

Hanna, W. F. The discharge of conidia in species of *Entyloma*. Mycologia 30: 526-536. 1938.

————————. Notes on *Clitocybe illudens*. Mycologia 30: 379-384. 1938.

————————. Control of seed-borne diseases. Man. Dept. Agric. Extension Bull. 104: 6-7. 1939.

————————. *Coprinus urticaecola* on stems of Marquis wheat. Mycologia 31: 250-257. 1939.

Hastings, R. J., J. E. Bosher, and William Newton. Bulb nematode control in iris by hot water. Can. Jour. Res. 17 (Sec. C): 144-146. 1939.

Hockey, J. F. Comparisons of orchard fungicides, 1938. N. S. Fruit Growers' Assn., Annual Report 75: 53-58. 1938.

Jones, Walter. Downy mildew of the rose in British Columbia. Sci. Agric. 18: 627-628. 1938.

————————. Raspberry disease investigation. B.C. Raspberry Committee Report, 1938. Appendix C. (Mimeographed.)

Koch, L. W. Blue mould of tobacco in Canada. Lighter 8: No. 3. July 30, 1938. (Mimeographed.)

Ledingham, G. A. Studies on *Polymyxa graminis*, n. gen. n. sp., a plasmodiophoraceous root parasite of wheat. Can. Jour. Res. 17 (Sec. C): 38-51. 1939.

Massey, L. M. Fungicides for roses. The Amer. Rose Annual 24: 103-111. 1939.

Mead, H. W. Shrivelling of wheat kernels by stem rust and its effect on seed value. Sci. Agric. 19: 481-493. 1939.

MOUNCE, IRENE and RUTH MACRAE. Interfertility phenomena in *Fomes pinicola*. Can. Jour. Res. 16 (Sec. C): 354-376. 1938.

SIMMONDS, P. M. Root development in relation to root rots of cereals. Sci. Agric. 19: 475-480. 1939.

————. A review of the investigations conducted in Western Canada on root rots of cereals. Sci. Agri. 19: 565-582. 1939.

VANTERPOOL, T. C. Some species of Pythium parasitic on wheat in Canada and England. Ann. Appl. Biol. 25: 528-543. 1938.

————. Root-rot diseases of cereals. Univ. of Sask., Agric. Exten. Bull. 92: 1-4. 1938.

————. Homothallism in Pythium. Mycologia 31: 124-127. 1939.

————, and P. M. SIMMONDS. The relation of browning root rot to stem rust in causing injuries to wheat. Sci. Agric. 19: 81-82. 1938.

WILLISON, R. S. Brown rot of peaches in transit and storage. Sci. Agric. 19: 458-474. 1939.